Making meaningful musical experiences accessible using the iPad

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Abstract. *In this paper we report on our experiences using ubiquitous computing devices to introduce music-based creative activities into an Australian school. The use of music applications on mobile tablet computers (iPads) made these activities accessible to students with a limited range of prior musical background and in a general purpose classroom setting. The activities were designed to be meaningful and contribute toward personal resilience in the students. We describe the approach to meeting these objectives and discuss results of the project. The paper includes an overview of the ongoing project including its aims, objectives and utilisation of mobile technologies and software with generative and networkable capabilities. Two theoretical frameworks inform the research design; the meaningful engagement matrix and personal resilience. We describe these frameworks and how they inform the activity planning. We report on the activities undertaken to date and share results from questionnaires, interviews, musical outcomes, and observation.*

1. Introduction

This project builds on the authors' previous work with network music jamming systems (Brown and Dillon 2007) and youth resilience (Stewart et al. 2004, Stewart 2014). These research threads have come together in this project. Taking advantage of the ubiquitous nature of mobile computing devices (in particular of Apple's iPad), the project aims to provide school students who have no particular background in music, with access to the creative and well-being benefits of collaborative and personally expressive music making. This project takes a step forward from our previous network jamming research by using Apple's GarageBand software on the iPad rather than the our own jam2jam software on laptop and desktop computers. jam2jam was specifically written for our previous research on how technologies afford meaningful engagement with music. It was used in this capacity between 2002 and 2012. The main software features of jam2jam that support accessibility and engagement are 1) the use of generative music processes to enable participation by inexperienced musicians, 2) the ability for systems to be synchronized over a network facilitating coordination amongst users, either locally or at a distance, and 3) the ability to record music making activities

and export these for sharing. These features are now present in GarageBand for iPad (and an increasing number of other commercial software and hardware combinations).

In our previous examination of developing resilience in school contexts, positive contributing factors included students developing a sense of autonomy and feelings of connectedness with peers and adults. We suggest that the scaffolding effect of generative music process can assist in promoting a sense of creative autonomy in inexperienced musicians and that the collaborative aspects of group music making can strengthen feelings of connectedness amongst peers. An aim of this project is to show how the principles of education and health-promotion developed in our previous research can transfer to the use of ubiquitous computing systems.

1.1 Brief description of the project

This project focuses on building and supporting young people's engagement and connectedness with their creative selves and to help build resilience through musical collaboration and success. Working with a school of Indigenous Australian students (the Murri school) based in Brisbane, Australia we have provided opportunities for musical expression using music technology through the school curriculum.

The project engages Indigenous Australian students using a digital audio production system that allows them to use their personal, social and cultural identities to make meaningful creative endeavors. The project trials newly emerging technology using iPads with GarageBand software to explore the development of self-confidence and self-esteem.

The approach involves the trialing of weekly music-based activities is several classes over two terms (20 weeks). The activities are designed to offer opportunities for students to achieve creative educational goals, to engage them in expressive music-making, to develop self-esteem and to develop creative collaborations with peers.

The project aims to provide evidence of a positive model for engaging school students in an interactive music-based education program and for building confidence and resilience. Objectives of the project include, to:

- Trial and evaluate new generative music technology to explore improvements in engagement and connectedness between students and the education system.
- Build resilience and raise the levels of educational achievement and aspirations of Indigenous students.
- Identify positive models of music education and health promotion.
- Use music technologies to build a sense of belonging and connectedness within the school environment that is protective of mental and emotional wellbeing.

2. Accessibility via mobile technologies

A catalyst for this project is the availability of appropriate computing software and hardware for music making. Apple's iPad and GarageBand software have features that make the activities of this project much more accessible than they have previously been. The iPad's small size and battery life make it easy for students to handle and easy for schools to accommodate. The GarageBand software utilizes 'smart instruments' and 'Apple loops' that simplify music production. The smart instruments provide a constrained performance environment that minimizes 'mistakes' and can be used in

music education in a similar way that restricted acoustic instruments (such as small xylophones) have been in the past. The music clips (Apple loops) allow for a constructor-set approach to music making where students can combine these building blocks without needing (yet) the facility to make the clips from scratch. The iPads and GarageBand combination support collaboration by allowing students, each with an iPad, to synchronize their music making over a local network. This activity, which we have previously called *network jamming*, facilitates groups of students to perform together. Finally, the ability of the software to record the music they compose and export files for later review and distribution, means that student's work can be available for reflection and/or sharing with the wider community.

3. Meaningful Engagement

The theory of meaningful engagement was developed by Andrew R. Brown and Steve Dillon (2012) and has underscored the development of network jamming research more broadly. It involves two dimensions. Musical *engagement* includes various creative behaviors, or ways of being involved in music. The modes of engagement outlined in the theory cover a range of interactions from listening and appreciating, to creating, performing and leading. The theory suggests that *meaning* can arise from engagements with music in three contexts; personal, social and cultural. That is, music can be personally satisfying, it can lead to positive social relationships, and it can provide a sense of cultural or community identity. Below is a summary of the modes of engagement and context for meaning.

Modes of Creative Engagement

- Appreciating – paying careful attention to creative works and their representations
- Evaluating – judging aesthetic value and cultural appropriateness
- Directing – leading creative making activities
- Exploring – searching through artistic possibilities
- Embodying – being engrossed in fluent creative expression

Contexts of Creative Meaning

- Personal – intrinsically enjoying the activity
- Social – developing relationships with others
- Cultural – feeling that actions are valued by the community

The two aspects of meaningful engagement can be depicted as the axes of a matrix, as shown in figure 1.

	Appreciating	Evaluating	Directing	Exploring	Embodying
Personal	Listen, Read, Watch	Analyze, Select	Compose, Produce	Improvise, Experiment	Practice, Play
Social	Share files	Discuss, Share playlists	Conduct, Lead	Jam	Rehearse, Record
Cultural	Attend Events, Patronage	Curate, Publish reviews	Promote, Manage	Publish research	Perform

Figure 1. The Meaningful Engagement Matrix with exemplar musical activities

The meaningful engagement matrix (MEM) is a framework for describing creative experiences and evaluating creative resources, plans or activities. This can be, for example, assessing a community or educational workshop, reviewing the comprehensiveness of an arts curriculum or lesson plan, evaluating the affordances of a software application for creating media content. While this matrix was developed for musical activities it can be applied to other pursuits, especially in the Arts.

Artistic experiences become meaningful when they resonate with us and are satisfying. The meaningful engagement matrix has been developed to assist inquiry into our creative activities and relationships. A full creative life, the theory suggests, involves experiences across all cells of the matrix. Therefore, this framework can be useful when auditing the range of experiences afforded by any particular activity, program or resource, or across a set/series of these. It is in the assessment of the whole-of-program view of this project that the MEM provides its greatest utility.

4. Resilience

Resiliency refers to the capacities within a person that promote positive outcomes such as mental health and well-being, and provide protection from factors that might otherwise place that person at increased development, social and/or health risk (Rowe & Stewart, 2009; Fraser, 1997). Factors that contribute to resilience include personal coping skills and strategies for dealing with adversity such as problem-solving, cognitive and emotional skills, communication skills and help-seeking behaviors (Fraser, 1997). This project builds on previous work that indicates that creative activities can improve resilience.

There is an abundance of research that highlights the importance of the social environment, or social relationships for fostering resilience (Maggi et al., 2005; Rowe & Stewart, 2009; Lee & Stewart 2013). Social cohesion or connectedness refers to broader features of communities and populations and is characterized by strong social bonds with high levels of interpersonal trust and norms of reciprocity, otherwise known as social capital (Siddiqui, et al., 2007). This network of rich social relationships and strong connections promote a sense of belonging and community connectedness which, in turn, impacts on an individual's mental health and overall well-being (AIHW, 2009). Social capital, spirituality, family support and a strong sense of cultural identity are key protective factors for Indigenous people (and children) (Malin, 2003).

Schools that aim to strengthen their capacity as healthy settings for living, learning, working and playing, and are underpinned by inclusive participatory approaches to decision-making and action, can help to build resilience (Rowe & Stewart, 2009). Connectedness in the school setting has been shown to be a protective factor of adolescent health risk behaviors related to emotional health, violence, substance use and sexuality. Creative activities, especially collaborative ones such as music making, share many of the characteristics that have been shown to promote resilience. This project seeks to take advantage of these connections.

5. Collaboration and Sustainability

With relevant support from the Murri school community, the project offered the opportunity to develop a creative and sustainable program for young people, in this case young Indigenous Australians, to engage in collaborative music making activities using interactive music technologies. The reason that music technology is appropriate for the project was because of its familiarity to young people and also because of our expertise in the use of generative systems in collaborative music making.

A number of creative projects use music jamming as a means of improving creativity, social justice and wellbeing, hence there are many collaborations with communities that are sometimes marginalized from mainstream society (Adkins et al. 2012). The GarageBand software for the iPad supports collaborative audio production through local synchronization via Bluetooth and through file and audio material export and import. When used as a musical instrument and compositional platform this software enables students to build on basic skills of exploration and improvisation and encourages engagement. These technologies are also easy for staff to learn and use and this, it is hoped will increase the likelihood that the network jamming activities will continue in the school beyond the life of this project. A number of strategies were used to facilitate the sustainability of the activities. These include:

- Involvement of school administration and teaching staff in the planning and execution of the activities.
- Integration of the music activities into the broader curriculum.
- Sharing of the musical outcomes amongst the school community.
- Regular reporting on progress with the school administration.
- Provision to leave the equipment used for the project with the school.

6. Case Study - iPads and Music at the Murri School

The goal of the project was to examine how music technology can work to improve Indigenous health and wellbeing by creating a sustainable program for Indigenous youth to engage in collaborative music making activities using interactive music technology.

Figure 2. Images from the project school

The project integrated music activities using the iPad into the normal school curriculum and involved relevant teachers. It used standard classroom procedures and resources but the project provided a facilitator proficient in the technologies and familiar with theories and objectives of the project. The project involved a weekly session with each class facilitated by a member of the project team and the class teacher.

Prior to commencing, approval was gained from Griffith University's Human Research Ethics Committee to conduct the research and teachers and students were provided with information about the project and teachers were consulted about how the music-based activities might integrate with existing curriculum objectives. Many teachers chose to incorporate creative writing tasks as the basis for song writing and rapping. The project used a whole-school approach and classes were chosen from across the full age range of the school for participation. Students and teachers were not screened for musical background nor on any measure of resilience as we were keen to investigate the versatility and flexibility of this approach across the school community.

After consultation with staff, three grade levels were selected to participate in the project. The year levels and project summaries for these classes are summarized in the following table.

Year Level	Approx. Age	Activity Objective
2/3	7/8	Students to write and record a short **4-line rap** about the good qualities they see in themselves
4	9	Students to record a creative interpretation of their **sonic personal profiles** utilizing sounds and music to express their personalities.
8	13	Students to write and record a **sonic poem** using text and music describing themselves and their hopes, expectations and dreams.

Table 1. Participating Groups and Activities

6.1 Designing music-based activities

Prior to facilitating the intervention with the students at the Murri school, a series of generic activities were designed in order to facilitate creative participation in a way that

adheres to the philosophy interwoven in the aforementioned MEM framework. The key objectives of the music-based activities designed for this project were to: 1) enable the students to engage in diverse music making opportunities that utilize music technology in a meaningful capacity; 2) to enable participants the opportunity to engage in creative experiences that assist in positively strengthening their sense of well being and resilience.

The activities designed for each year level were collaboratively developed by the researchers and participating class teachers, keeping the MEM in mind throughout this process. Each teacher chose to utilize an age/ability appropriate literacy basis for their class project in order to facilitate the opportunity for students to individually and collectively express themselves and their interests in a personal and creative manner.

The objective for Term 1 was to enable students of each participating group to develop and record their own composition using GarageBand on the iPads. The timeline below outlines the context of each weekly session dedicated to the project, allowing for students of each group to spend time experimenting, jamming, practicing playing and recording instruments and external audio, and for recording the final product. The objective for Term 2 was for students to develop and refine their work into a form ready for a 'signature' event—a public performance at the school assembly.

Table 2 lists the mode and context of activities designed to achieve the key objectives of this project. Each cell corresponds to specific mode and context combination within the MEM.

		ATTEND Listening / Observing	**EVALUATE** Reflecting / Analyzing	**EXPLORE** Experimenting / Improvising Conscious	**DIRECT** Decision Making / Instructing	**EMBODY** Playing / Performing Establishing habits
PERSONAL (Of the self)	Objective	Independently listen, read and observe in order to become aware of relevant knowledge	Independently reflect and analyze personal practice as a means of facilitating continued learning.	Independently explore and experiment with relevant artefacts and processes.	Engage in technical activities that lead to creating a musical artefact.	Independent practice / playing
	Activity	Introduction to Network Jamming Demonstration of available interactive music hardware and software.	Record/journal learning and practical experiences. Music analysis to enable the development of aural skills.	Independently explore and experiment with sounds and functions of Network Jamming devices. Building knowledge.	Setting up a Jam session. Composing a song.	Guided and Independent Play / Practice of Network Jamming devises and processes to building skills.
SOCIAL (Collaborative)	Objective	Share work and progress with peers.	Reflect upon learning and practical experiences with peers as part of group discussions.	Extend learning through collaborative experimentation.	Take on a leadership role within a group activity.	Rehearse and record with a group.

	Activity	Workshop presentations of individuals and collaborative engagement and progress with Network Jamming.	Group Discussion.	Engage in a group (Networked) Jam session.	Lead and Conduct a Jam Session. Group Composition.	Time to play/practice with Network Jamming devices and processes collaboratively.
CULTURAL (Connection with external)	Objective	Observe relevant activity as performed in a public context.	Extend and connect reflective practice to include a wider cultural participation and dialogue.	Examine / research relevant practice in a wider cultural context.	Support and promote a musical artefact for public distribution.	Participate in a group public performance.
	Activity	Attending / Observing a performance that utilizes Network Jamming as a key composition / performance process.	Develop a creative project for public presentation. Create a Blog /website as a reference for music work.	Investigating Network Jamming in diverse cultural contexts. Explore other commercial music apps.	Create and Promote a CD/DVD showcasing creative progress.	Perform a group 'Jam' or composition to an audience.

Table 2. Music-based activities across the Meaningful Engagement Matrix.

6.2 Measuring resilience and engagement

Evaluation of this project relied on a mixed methods research design combining quantitative and qualitative methods of data collection, analysis and inference in order to investigate both the processes developed through the life of the project as well as the impact of the project over time.

Students were asked to complete a modified version of a pre-existing resilience questionnaire that has high levels of reliability and validity (e.g., Healthy Kids Survey - California Dept of Education, 2004). Key informant interviews with staff were conducted and subject to an ongoing thematic analysis. An introductory school consultation session was attended by 9 staff members at the outset of the project. All were supportive and identified ways that they could integrate the project into their curriculum. Due to timetabling constraints only three of these staff and their classes are participating in the project.

Thirty four students participated in the project across three grade levels: Years 2/3 (14 students); Year 4 (12 students); and Year 8 (8 students in the English stream). Activities included developing a Rap, recording a personal sonic profile and writing and recording a bio-poem. Observations of class sessions were recorded in a journal by a member of the research team. In addition, files of work completed on the iPad were regularly saved allowing for analysis of the steps taken during the creative process.

7. Survey results summary

The first stage of data collection provided a baseline and descriptive statistics show some differences emerging between the younger students in Grade 2/3 and 4 and their fellow students in Grade 8. We have not completed tests of statistical significance as the sample is small. We provide, below, a selection of the results and findings. This summary begins with some data from the first resilience survey to give a sense of the student's attitudes and expectations from the project.

Over 75% of the total student sample thought that being involved in the project would be fun and most (younger students) were excited at the prospect. The creative levels and aspirations of the students were uniformly high and almost all indicated that they enjoyed going to music performances. However, compared to the grade 2/3 and 4 students who relished the creative opportunities of the project, a substantially lower percentage of the Grade 8 sample felt confident and supportive of the activity and their creative role.

With regard to their confidence with and support structure for creative activities:

- Over 85% of all students like making things that are creative and different.
- Students felt variously confident with their own creative ability and ideas. (71% of Grade 2/3, over 90% of Grade 4 students, Grade 8 = 63%).
- Most students have family/elders that they can go to for help (Grade 2/3=79%, Grade 4 = 90%, Grade 8 = 75%)

The students' attitudes toward peer collaboration varied between the younger and older students. The following data reflect these attitudes to working with classmates:

- Students like to share their creative ideas with their classmates (Grade 2/3 = 78%, Grade 4 = 90%, Grade 8 = 37%).
- Students enjoy hearing about their classmates' creative ideas (Grade 2/3 82%, Grade 4 = %85, Grade 8 = 63%).
- Students thought that being a part of the project would help them have more friends (Grade 2/3 = 75%, Grade 4 = 75%, Grade 8 = 12%).

As with attitudes to collaboration, the students' sense of self-confidence in public music making also reduced with age. In relation to producing a performance or recorded outcome:

- Students thought that they could put together a performance or recording that would be enjoyed by others (Grade 2/3 = 86%, Grade 4 = 66%, Grade 8 = 12%).
- Students felt that people would come to watch their performance or record launch (Grade 2/3 = 90%, Grade 4 = 75%, Grade 8 = 25%).

A clear trend in this data is the difference in reported self-confidence, in music at least, between the younger (7-9 year old) and older (13 year old) students. This is consistent with much more extensive research that shows a dip is self-confidence in adolescents (Orenstein 1994). As a result of this, and supported by informal feedback from the grade 8 teacher, we adopted a different strategy for the older group. Activities for this class focused more on personal meaning than on social or cultural meaning, and we tried to

minimize potentially embarrassing public presentations of the music. As well, work for older students has a greater individual focus whereas activities for younger students are heavily biased toward group work and include class and public presentation of outcomes in the form of recorded media and live performance. What is interesting to note, is that the accessibility features of the music technologies employed are equally applicable for both groups and approaches.

A comparison of results from participants in both baseline and follow up surveys shows that in relation to project participation 75% of Grade 4; 72.7% of Grade 2 and 66.7% of Grade 8 thought that being involved in the project was fun all, or most of the time. At the same time, however, participating in the project was also considered stressful by some at least, with 27.3% of Grade 2/3 feeling worried about taking part in the project all or most of the time (Grade 4=75%; Grade 8=33.3%).

8. Qualitative results summary

Qualitative data collected included interviews conducted with teachers and notes maintained by research team members.

8.1 Pre-intervention results

Staff members recorded their initial plans for implementing the project within their classrooms for Term 1 and Term 2, 2013. Eight out of the nine staff members participated in this component of the staff session. Participant responses to what they hoped to achieve by being involved in the project include:

- For the students to record stories created for English unit. The story can be edited and compiled onto a CD. Hopefully children will gain confidence in speaking and sharing their stories/ideas.
- I would like to see students engage with iPad technology to enhance and extend learning already happening in subjects.
- Improve teacher and student confidence and participation with technology; having children work together cooperatively; tap into children's different learning styles i.e. rap songs to learn spellings; student enjoyment.
- To use the jamming as a learning/teaching tool in classroom – to integrate curriculum to make learning fun.
- To learn myself and get children involved in expressing themselves orally and musically.
- To record for a performance, to make learning fun and for students to use an iPad.
- Enhancement of student work (oral and written) – familiarity with technology.
- Increase iPad literacy, learn with students how to use this tool for work.

The research team utilized the Meaningful Engagement Matrix to record the frequency and intensity of meaningful engagements they observe in students participating in the project. Video footage and photography were also being used to provide further documentation of project implementation activities, and for review and analysis.

8.2 Post-intervention results

Classroom management

In terms of general process, the participating classroom teachers had differing opinions regarding how manageable it is to have a class of students work with the iPads for engaging in learning and collaborative work. Two of the teachers felt that this was a manageable task, whereas one of the teachers (Grade 4) felt that this process of learning would work best in smaller groups as children may have difficulty listening to instructions and paying attention in a larger group. Some of the challenges in participating in the project include student's inability to share iPads–they preferred to work on their own. Another challenge lay in having a consistent and clear idea of the long-term goal and clarifying goals for students to be achieved at the end of each session.

One teacher felt that at times it seemed that the students were 'all over the place'. This was due to the students showcasing their ability to 'jam' on the iPads using different musical instruments available on GarageBand. Jamming with colleagues allows for creative expression that relies on self-expression. The grade 4 teacher felt that not being present regularly, and not understanding how to use the iPads and remembering it were challenges. Also, keeping all the students on task when the whole class was involved was a challenge. She felt that keeping the iPad project in a small group environment might assist in overcoming some of these challenges.

However, in terms of how satisfied the teachers were with the way the project had been implemented in their class, there was general consensus that they felt that the project went well and that the students looked forward to the sessions on the iPad.

Student engagement

The Grade 2 teacher was really impressed that his more challenging students, who rarely engaged in classroom activities, were able to participate confidently in the project. Those that had difficulty with directing their attention to one specific task for a period of time were able to participate in the iPad sessions for the course of the weekly schedule.

The Grade 8 teacher felt that he under-estimated the students' reluctance to share their work. He felt that his lack of knowledge of technology/iPads required increased reliance on the research assistants. He acknowledged that the students had a product at the end of the project, but considered that the iPads could have been better used.

Teacher engagement

The Grade 4 teacher felt that there were components of the program that she liked and some parts of the program she did not find helpful in making the project run smoothly. Teacher ownership is a critical success factor for the sustainability of the project. She felt that because she wasn't there most of the time for the weekly iPad sessions, she found it difficult to gauge how effective the implementation was going. She indicated that there were times when it was confusing what the object of the lesson was. This

reinforced the importance of working with the teachers to develop an action plan for their students and take a leadership role in achieving their goals and objectives.

The participating teachers relied on the research assistants to set weekly plans for the students, offering limited guidance and support. Behaviour management was a challenge each week for the research assistants. Often teacher aides were the only other adults present to provide additional supervision for the children and at times sessions were taken up with disciplining students.

The 'signature' event

The grade 4 teacher stated that he enjoyed watching those children who performed on assembly and that the end of project performance sounded good. He stated that some of the students are normally really shy and would never get up on their own. But, because they were in a group and focusing on the iPad they coped.

All teachers stated that they were happy with what their class had achieved by participating in the project. The Grade 8 teacher stated that hopefully they will have greater confidence to use technology in relation to English.

9. Findings

All teachers considered that their involvement in the project has made a difference to the way they have looked at teaching. The grade 4 teacher stated that it gave her another avenue through which to teach. Technology is the focus of our learning now, she said. The grade 8 teacher stated that it has highlighted a need to use technology in the class. Students have access to it outside of school they use it all the time–it is a tool he feels he needs to tap into for learning. All participating teachers have plans to continue to use this form of learning for future teaching.

The teachers felt it is beneficial to have a structure around using the iPads. To start with structure was thought to be important i.e., weekly plan/within a subject such as English. The grade 8 teacher felt that freedom to be creative can flow on from this.

All teachers felt that the project had had a positive impact on the students. The Grade 8 teacher stated that the students looked forward to 'Friday' sessions. He stated that although they were shy, he believes that they were secretly proud of what they did. The Grade 4 teacher said that they loved it and looked forward to it. She also said that she could use the iPads as a reward for good behavior.

All teachers stated that they would recommend using the iPads as an approach to learning to other teachers. The Grade 2 and 8 teachers felt confident in sharing this approach to learning with colleagues. All teachers felt that they would have liked more professional development on using the iPads.

9.1. Lessons learnt

This project aimed to examine how music technology can work to improve student health and wellbeing. The project aimed to offer the opportunity to develop a creative and sustainable program for young Indigenous Australians to engage in collaborative music making activities using interactive music technologies. The following lessons have been learned from this pilot project:

- An in-class project of this nature requires relevant support from the whole Murri school (Indigenous) community.
- A planned period of in-service training and support with the teachers would help to ensure that the project is introduced with confidence and becomes sustainable beyond the life of the project.
- Small group work with all students accessing the technology would ensure better student engagement.
- A clear link between curriculum frameworks and the use of iPad technology would help to engage the project within the School's learning framework.
- Indigenous students enjoy and engage with advanced technology within the classroom and develop meaningful, creative compositions.
- The Meaningful Engagement Matrix provides a strong theoretical framework for a School-based creative project.
- Additional research is needed to confirm the reliability and validity of the questionnaire with consideration given to a range of instrument structures to allow for widely varying age/developmental conditions.
- This project provides a constructive and stimulating experience for many young people who find group work difficult and have communication difficulties.
- Public performance of creative, music-based projects provide important opportunities to enhance self-esteem and promote creative partnerships.

10. Conclusion

In this paper we have described our use of mobile technologies and software to make music-based activities accessible to young people in a way that promotes meaningful engagement and resilience. The project is based in the Murri school in Brisbane, Australia that is dedicated to the education of Indigenous Australians. The project involved weekly activities with three classes from that school over 20 weeks with students ranging from ages 7-13.

The design of project activities was informed by theories of meaningful engagement and resilience, but were guided by the advice of class teachers and student survey responses to ensure appropriateness to the local context.

Data indicate that staff and students are enthusiastic about using the tablet computers and music apps, and that their ease of use is making previously unimagined music production activities accessible. Consistent with other studies, our data show a dip in the creative self confidence of students in their early teens (compared to younger students). This has been accommodated for by shifting the emphasis for those students toward individual and personal expression and away from collaborative and public activities.

The portability of the iPad hardware has assisted with the integration of the devices into the school environment, and their multi-purpose nature makes for fluid shifts between music and other curricular tasks (such as creative writing). The GarageBand software has facilitated rich music production outcomes, although the

devices alone provided limited audio recording and playback quality. We plan to address this in the next stage of the project through more extensive use of external microphones and headphones.

Indications are that the students can be keenly engaged in network jamming activities but require an ongoing facilitator support to maximize creative outcomes. The features of the music-based activities with ubiquitous technologies align well with characteristics that promote resilience, including personal autonomy and connectedness with peers and adults, and we remain optimistic that evidence of a positive effect on student resilience from the project can be achieved.

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